#16
8/9/02

PATENT 1765

Customer Number 22,852
Attorney Docket No. 04329.2199

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Kenro NAKAMURA, et al.	)	Group Art Unit: 1765
	)	
Application No.: 09/453,831	)	Examiner: Umez-Eronini, Lynette T.
	)	
Filed: December 2, 1999	)	
	)	
For: POLISHING METHOD AND POLISHING LIQUID	)	

Commissioner for Patents
Washington, DC 20231

Sir:

TRANSMITTAL OF APPEAL BRIEF (37 C.F.R. 1.192)

Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on June 3, 2002. The due date for response extends through Monday, August 5, 2002 (with August 3, 2002 being a Saturday).

This application is on behalf of

☐ Small Entity ☒ Large Entity

Pursuant to 37 C.F.R. 1.17(f), the fee for filing the Appeal Brief is:

☐ $160.00 (Small Entity)

☒ $320.00 (Large Entity)

TOTAL FEE DUE:

Notice of Appeal Fee	$ 320.00
Extension Fee (if any)	$ 0.00
Total Fee Due	$ 320.00

☒ Enclosed is a check for $320 to cover the above fees.

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PETITION FOR EXTENSION. If any extension of time is necessary for the filing of this Appeal Brief, and such extension has not otherwise been requested, such an extension is hereby requested, and the Commissioner is authorized to charge necessary fees for such an extension to our Deposit Account No. 06-0916. A duplicate copy of this paper is enclosed for use in charging the deposit account.

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: August 5, 2002

By: Richard V. Burgujian Reg No 24,014
for
Richard V. Burgujian
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Assistant Commissioner for Patents
Washington, DC 20231

Sir:

APPEAL BRIEF

Pursuant to 37 C.F.R. § 1.192, Appellants submit this Appeal Brief to the Board of Appeals and Interferences, in triplicate, and accompanied by a check in the amount of $320.00 to satisfy the fee under 37 C.F.R. § 1.17(c). This Appeal is from the Final Office Action of January 3, 2002. Appellants filed a Notice of Appeal on June 3, 2002, and accordingly, submission of this Appeal Brief on or before August 5, 2002 (August 3, 2002 being a Saturday) is timely.

I. Real Party in Interest

The real party in interest is Kabushiki Kaisha Toshiba, a corporation of Japan, by virtue of an assignment that was recorded on December 2, 1999, at Reel 010432, starting at Frame 0017.

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II. Related Appeals and Interferences

There are currently no known Appeals or Interferences related to this application that are awaiting decision by the Board of Patent Appeals and Interferences.

III. Status Of Claims

Claims 11 – 22 are pending for the purposes of this Appeal Brief, with claims 13 – 16 withdrawn from consideration, as drawn to a nonelected invention, with traverse by Appellants. The claims on appeal are set forth in an attachment entitled "Appendix A."

IV. Status Of Amendments

Appellants filed a Response After Final ("Response") on April 3, 2002. In the Advisory Action, dated April 11, 2002, the Examiner indicated that the amendments to the claims proposed in the Response would be entered for the purposes of Appeal.

V. Summary Of Invention

The present invention relates to a polishing method useful in chemical mechanical polishing (CMP), comprising preparation of a first polishing liquid containing tetravalent cerium ions (or cerium (IV) nitrate) in a first concentration; adding a solvent to said first polishing liquid to form a second polishing liquid containing tetravalent cerium ions (or cerium (IV) nitrate) in a second concentration lower than the first concentration, followed by polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid, wherein said addition of the solvent is carried out upon or immediately before the polishing of said substrate. (See Appellants' claims 17 and 22, for example.)

As semiconductor device component dimensions continue to decrease, thereby enabling denser packing of integrated circuits (ICs) on wafers, CMP has emerged as a fundamentally necessary tool for modern IC fabrication. CMP is used to polish and flatten wafer surfaces between processing steps to eliminate unwanted material from the surface of a partially

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fabricated device, which in turn prepares the surface for subsequent processing steps (such as film deposition, etc.).

CMP utilizes a polishing liquid or slurry between the surface to be modified and a rotating pad or disk. A range of polishing liquids are available, and these liquids contain materials designed to chemically and mechanically "attack" the surface to which they are applied. This combination of chemical and mechanical removal of material results in a highly-efficient surface preparation technique.

Surfaces prepared by CMP are extremely flat, which is ideal for modern IC fabrication. This contrasts with conventional wet etching and dry etching technologies, which may not produce a flat or even surface in a reproducible manner. While wet etching and dry etching technologies are useful in certain aspects of IC fabrication, CMP is used to remove unwanted material in a highly-controlled and reproducible manner.

Processing steps during the fabrication of dynamic random access memory (DRAM) chips and next-generation nonvolatile ferroelectric random access memory (FRAM) chips includes formation of dielectric films that are compatible with lower electrode materials. Compatibility is judged in part by low lattice mismatch at the atomic-scale interface between the materials, wherein low lattice mismatch reduces interfacial strain and also improves adhesion of deposited film layers. To improve this interface compatibility, materials with similar crystal structures are selected for different layers in a given device, e.g., for the interface between an electrode layer and a dielectric layer. Noble metals or conductive oxides of perovskite-type crystal structure are now preferred for the lower electrodes and dielectric films, e.g. ruthenium (Ru) and Ru–compounds such as Ru-oxides, particularly $SrRuO_3$. These materials, however, are chemically stable in general and therefore ideal for use in DRAMs and FRAMs, but this makes it difficult to employ standard processing techniques (i.e. wet etching or dry etching,

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mentioned earlier) for fabrication of lower electrodes and dielectric films. (Specification, p. 1, l. 18 – p. 2, l. 5). Since wet etching or dry etching may not produce flat surfaces reproducibly when applied to noble metals or conductive oxides of perovskite-type crystal structure, CMP is ideal for processing these materials in a reproducible manner.

Exemplary processing steps are illustrated, for example, in Appellants' Figs. 2A – 2C, wherein CMP is used to prepare a $SrRuO_3$ lower electrode 15 in a patterned region of SiO_2 stopper film 13 to prepare the surfaces of these materials for deposition of a $BaSrTiO_3$ dielectric film. (See also Specification, p. 18, l. 10 – p. 19, l. 22).

Of fundamental importance to the effectiveness of CMP is the choice of polishing liquid or slurry. Conventional polishing liquids are defective for CMP surface preparation of noble metals or conductive oxides of perovskite-type crystal structure, in that the polishing rate is low. Low polishing rates result in low manufacturing efficiency. Furthermore, conventional polishing liquids do not distinguish between these new materials during polishing, e.g., between lower electrode materials (e.g. $SrRuO_3$) and those materials used as "stopper films" (e.g. SiO_2) (to indicate a certain depth of polishing). This low selectivity between material types makes it difficult to obtain a uniform and stable processed surface during CMP. (Specification, p. 2, ll. 12 – 20).

The present invention solves these problems by providing a polishing method that effects a high polishing rate and a high selectivity ratio relative to the underlying film layers, in the situation where noble metals or conductive oxides of perovskite-type crystal structure are polished using CMP, particularly for Ru and Ru-compounds such as $SrRuO_3$.

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VI. Issues

A. Whether claims 11 and 17 – 22 define patentable subject matter under 35 U.S.C. § 102(e) over Westmoreland (U.S. Patent No. 6,143,192).

B. Whether claim 12 defines patentable subject matter under 35 U.S.C. § 103(a) over Westmoreland (U.S. Patent No. 6,143,192).

VII. Grouping Of Claims

All of the claims do not stand or fall together.

1. Regarding the rejection under 35 U.S.C. § 102(e), claims 11 and 17 - 21 stand together, and claim 22 stands alone.

2. Regarding the rejection under 35 U.S.C. § 103(a), claim 12 stands alone as dependent from base claim 17.

VIII. Argument

A. Whether claims 11 and 17 – 22 define patentable subject matter under 35 U.S.C. § 102(e) over Westmoreland (U.S. Patent No. 6,143,192).

Appellants submit that the rejection of claims 11 and 17 – 22, based on 35 U.S.C. § 102(e) should be reversed because the Examiner has failed to establish that these claims are anticipated by the prior art relied upon.

In the Final Office Action of January 3, 2002, the Examiner maintained the rejection of claims 11 and 17 – 22 under 35 U.S.C. § 102(e) as anticipated by Westmoreland (U.S. Patent No. 6,143,192). In addition, the Examiner advised Appellants that claim 17 was objected to for a misspelling. Accordingly, Appellants' Amendment after Final of April 3, 2002, which was entered for the purposes of Appeal, corrected a typographical error to overcome the Examiner's objection to claim 17.

Appellants respectfully submit that the rejection of claims 11 and 17 – 22 under 35 U.S.C. § 102(e) as anticipated by Westmoreland should be reversed.

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Appellants point out that in order to properly establish that Westmoreland anticipates Appellants' claimed invention under 35 U.S.C. § 102(e), each and every element of each of the claims in issue must be found, either expressly described or under principles of inherency, in that single reference. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." See M.P.E.P. § 2131, p. 2100-69, quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Finally, "[t]he elements must be arranged as required by the claim." M.P.E.P. § 2131, p. 2100-69. Regarding the 35 U.S.C. § 102(e) rejection, Westmoreland does not teach each and every element of Appellants' present invention as claimed.

In the 35 U.S.C. § 102(e) rejection, the Examiner alleged that "[d]issolving the 0.5 – 70 weight percent of ceric ammonium in water forms a second polishing solution that is more diluted than the first polishing liquid, and is the same thing as adding a solvent to said first polishing liquid to form a second polishing liquid" (Final Office Action, pp. 4 – 5). The Examiner also alleges that the "addition of the solvent [in Westmoreland] is carried out upon or immediately before the polishing of said substrate..." (Final Office Action, p. 5).

Appellants' contest these allegations and submit that the present invention as recited in independent claim 17 and independent claim 22 is clearly not anticipated by Westmoreland. Westmoreland does not disclose Appellants' claimed:

> "polishing method comprising: preparing a first polishing liquid containing tetravalent cerium ions in a first concentration; adding a solvent to said first polishing liquid to form a second polishing liquid containing tetravalent cerium ions in a second concentration lower than the first concentration; polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid, wherein said addition of the solvent is carried out upon or immediately before the polishing of said substrate" (independent claim 17), or "polishing method comprising: preparing a first polishing liquid

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containing cerium (IV) nitrate in a first concentration; adding a solvent to said first polishing liquid to form a second polishing liquid containing cerium (IV) nitrate in a second concentration lower than the first concentration; polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid, wherein said adding of the solvent is carried out upon or immediately before the polishing of said substrate" (independent claim 22).

In contrast, Westmoreland discloses a "Ruthenium and Ruthenium Dioxide Removal Method and Material" (Westmoreland, title). Westmoreland's preferred embodiment teaches that the material is "in the form of a liquid etchant solution" (col. 3, ll. 46 – 47), which "may be an aqueous solution wherein ceric ammonium nitrate, and, optionally, other solutes, are dissolved in liquid water" (col. 3, ll. 47 – 49).

Appellants do not accept the Examiner's characterization of Appellants' claims 17 or 22, since Westmoreland does not disclose

"*adding a solvent to said first polishing liquid to form a second polishing liquid …* in a second concentration lower than the first concentration; polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid, *wherein said addition [/adding] of the solvent is carried out upon or immediately before the polishing of said substrate*," (claims 17 and 22, emphasis added).

The passages in Westmoreland relied upon by the Examiner to teach formation of the first and second solutions, specifically, Westmoreland, col. 3, ll. 42 – 49 and 55 – 57, merely disclose alternative embodiments of Westmoreland's invention and not the specifically recited two-solution system and polishing method of Appellants' claims 17 and 22. Westmoreland discloses material that may be in the form of a liquid etchant solution where the solution "…may be an aqueous solution wherein ceric ammonium nitrate and optionally, other solutes, are dissolved in liquid water" (Westmoreland, col. 3, ll. 42 – 48). While Westmoreland also teaches that it "also provides for a slurry for use in planarization processes, including chemical

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mechanical planarization" (Westmoreland, col. 5, ll. 23 – 25), Westmoreland only refers to only one liquid etchant / slurry solution that may comprise ceric ammonium nitrate and other solutes dissolved in water. Westmoreland further discloses in one embodiment that the material of the invention "may include about 0.5 to about 70 weight percent ceric ammonium nitrate" (Westmoreland, col. 3, ll. 54 – 56). Contrary to the Examiner's assertion, this language merely further defines the concentration range of ceric ammonium nitrate in Westmoreland's material, and does not teach or suggest Appellants' claimed:

> "polishing method comprising … adding a solvent to said first polishing liquid to form a second polishing liquid … wherein said addition [/adding] of the solvent is carried out upon or immediately before the polishing of said substrate" (Appellants' claims 17 and 22).

As such, the Examiner's allegations have no factual basis. None of Westmoreland's exemplified embodiments disclose "each and every element of each of the claims in issue [claims 17 and 22] … either expressly described or under principles of inherency." Furthermore, Westmoreland is not "in as complete detail as is contained in … claim [17 or 22]." See M.P.E.P. §2131, p. 2100-69, quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

Westmoreland's examples do, however, teach a single bath used for etching purposes. "Samples of ruthenium and ruthenium dioxide films … were immersed in a room temperature … bath of CR-14 Chrome Etchant" (Westmoreland, col. 7, l. 58 – col. 8, l. 1; and also disclosed generally in "Example 2" and "Example 3"). There is simply nothing in Westmoreland that discloses:

> "adding a solvent to said first polishing liquid to form a second polishing liquid … in a second concentration lower than the first concentration … wherein said addition [/adding] of the solvent is carried out upon or immediately before the polishing of said substrate" (Appellants' claims 17 and 22).

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Westmoreland is clearly different from Appellants' invention, as claimed in independent claims 17 or 22. Simply providing a bath of commercially available "CR-14 Chrome Etchant consist[ing] of 30% by weight ceric ammonium nitrate, 10% by weight acetic acid, and 60% by weight water" (Westmoreland, col. 8, ll. 3 –5), does not discloseAppellants' claimed:

> "first polishing liquid containing tetravalent cerium ions in a first concentration; *adding a solvent to said first polishing liquid to form a second polishing liquid* containing tetravalent cerium ions *in a second concentration lower than the first concentration*" (claim 17, emphasis added); or "first polishing liquid containing cerium (IV) nitrate in a first concentration; *adding a solvent to said first polishing liquid to form a second polishing liquid* containing cerium (IV) nitrate *in a second concentration lower than the first concentration*" (claim 22, emphasis added), "wherein said *adding of the solvent is carried out upon or immediately before the polishing* of said substrate" (claims 17 and 22, emphasis added).

Furthermore, Westmoreland does not disclose an effective invention that can teach the elements of Ru – oxide removal. Westmoreland professes "[a] method for removing at least a portion of a structure, … including ruthenium metal and/or ruthenium dioxide" (Westmoreland, Abstract). Yet Westmoreland presents misleading information to one who should be enabled to make and use his invention. Appellants point to both "Example 2" and "Example 3," wherein Westmoreland discloses "[n]o crystalline ruthenium dioxide was removed by the CR-14 Chrome Etchant" (col. 8, ll. 15 – 17), and "the annealed crystalline ruthenium dioxide film was not etched in the procedure" (col. 8, ll. 58 – 60). As mentioned earlier in this Appeal Brief, noble metals or *conductive oxides of perovskite-type crystal structure* are chosen for the lower electrodes and dielectric films, *e.g. ruthenium (Ru) and Ru–compounds such as Ru-oxides*, particularly $SrRuO_3$. These materials are ideal for use in DRAMs and FRAMs. Westmoreland admits that crystalline Ru oxides are not removed by his single-step etch bath procedure utilizing a commercially-

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available Cr etchant. This also contrasts with Appellants' invention, wherein "[a] typical example of the Ru compound that is to be polished in the present invention is $SrRuO_3$" (Appellants' specification, p. 8, ll. 4 – 5; see also Appellants' claim 12, which will be discussed in the subsequent section), where "$SrRuO_3$ is used in place of Ru for forming the lower electrode" (Appellants' specification, p. 18, ll. 5 – 6), and "a $BaSrTiO_3$ film 16 acting as a dielectric film is formed … [and] annealed to form crystals of perovskite structure" (Appellants' specification, p. 19, ll. 7 – 12). Appellants note that $SrRuO_3$ also has a perovskite crystal structure, which lends itself to compatibility with the $BaSrTiO_3$ dielectric film (discussed earlier in the Summary of Invention). Appellants submit that, in addition to not disclosing each and every element of Appellants' claimed invention, Westmoreland does not effectively disclose an invention to solve problems, such as crystalline Ru – oxide removal, which are solved by Appellants claimed polishing method.

Finally, in the Advisory Action of April 11, 2002, the Examiner alleged that Westmoreland's "material" "is the same as [Appellants'] first polishing liquid," and that Westmoreland "suggests that the (first polishing liquid) material can be dissolved thereby making a solution … which reads on forming a second polishing liquid." Appellants submit that this inference is far from Westmoreland's disclosure, as already established. The Examiner has therefore failed to establish a *prima facie* case of anticipation.

As discussed above, Westmoreland fails to disclose each and every element of Appellants' independent claims 17 and 22, either expressly described or under principles of inherency. Westmoreland discloses "…*the material* of the invention for removing ruthenium metal and/or ruthenium dioxide includes an amount of ceric ammonium nitrate. *The material* of the invention may be, for example, a solution of ceric ammonium nitrate" (col. 3, ll. 42 – 46, emphasis added). This description merely suggests that a solution of ceric ammonium nitrate

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may be used to remove ruthenium metal and/or ruthenium dioxide (which is misleading, as mentioned earlier, in that it only removes *amorphous* ruthenium dioxide). Westmoreland continues with: "*[t]he material* may be in the form of a liquid etchant solution, and, in one form, the solution may be an aqueous solution wherein ceric ammonium nitrate and, optionally, other solutes, are dissolved in liquid water" (col. 3, ll. 46 – 49, emphasis added). All three italicized phrases of "the material," indicated above, represent the same thing, i.e. one, single etchant, only introduced as usable in several different forms. Although the Examiner considers the first polishing liquid material as dissolved to form a different, second polishing liquid, there is no such implication in Westmoreland. Westmoreland simply teaches that "ceric ammonium nitrate, and, optionally, other solutes, are dissolved in liquid water" (col. 3, ll. 48 – 49), and does not teach that a solvent is added to this solution to form a second polishing liquid. While Westmoreland discloses "[o]ther additional components … may be added to the solution…" (col. 3, ll. 53 – 54), this is not taught in a manner indicating that the solution is diluted to form a second polishing liquid in a second concentration lower than the first concentration, wherein addition of the solvent is carried out upon or immediately before the polishing, as claimed by Applicants.

Thus, Westmoreland does not disclose an identical invention, let alone "in as complete detail is contained in [Appellants'] claim" (M.P.E.P. § 2131, p. 2100-69), and the elements of Westmoreland are not arranged as required by Appellants' claims 17 and 22.

Since Westmoreland does not disclose each and every element of Appellants' present invention, Westmoreland cannot anticipate either of independent claims 17 or 22. Therefore, Appellants respectfully submit that the rejection of independent claim 17 over Westmoreland should be overturned, as should the rejection of claims 11 and 18 – 21, at least because claims 11

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and 18 – 21 are dependent from base claim 17; and that the rejection of independent claim 22 over Westmoreland should be overturned.

B. Whether claim 12 defines patentable subject matter under 35 U.S.C. § 103(a) over Westmoreland (U.S. Patent No. 6,143,192).

The rejection of dependent claim 12 under 35 U.S.C. § 103(a) as unpatentable over Westmoreland should be reversed. The only prior art relied upon by the Examiner in support of this ground of rejection is Westmoreland.

Regarding the 35 U.S.C. § 103(a) rejection of claim 12, Appellants respectfully submit that this rejection should be reversed because the Examiner has failed to establish a *prima facie* case of obviousness. Appellants disagree with the Examiner's arguments and conclusions. The Examiner does not show that all the elements of Appellants' claims are met in Westmoreland, and does not show that there is any suggestion or motivation to modify the cited reference to result in Appellants' claimed invention. "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." See M.P.E.P. § 2143.03, p. 2100-26.

A *prima facie* case of obviousness has not been made, since Appellants have already demonstrated that Westmoreland fails to teach all of the features of independent claim 17, as pointed out in the previous section. The Examiner alleges that "Westmoreland differs only in failing to teach the Ru compound is $SrRuO_3$" (Final Office Action, p. 5). This statement, while true in part (Westmoreland differs from Appellants' invention in many other ways, such as those pointed out in the previous section), still does not address the recitations of independent claim 17, which were quoted in the previous section, that Westmoreland neither teaches nor suggests.

Appellants contest the Examiner's allegation that "it would have been obvious … to modify Westmoreland by replacing a Ru compound with a SrRuO3 compound because they are seen as equivalent: they are conductors." (Final Office Action, p. 5). Appellants submit that the

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Examiner's statement is an unsubstantiated generalization of questionable relevance to rejected claim 12. Appellants have already established that $SrRuO_3$ has a perovskite crystal structure, and already established that Westmoreland admits not being able to etch crystalline Ru oxide compounds, of which $SrRuO_3$ is an example. Appellants submit that it is a logical conclusion to draw that if Westmoreland's invention does not teach removal of crystalline Ru oxide, it cannot teach removal of the perovskite crystal structure of $SrRuO_3$, and therefore, "Ru compound" (Westmoreland) and $SrRuO_3$ (in Appellants' claim 12) are not equivalent, and it would not be obvious to replace one compound with the other. Westmoreland's invention would be ineffective at removing the perovskite crystal structure of $SrRuO_3$, and, as such, there would be no motivation to replace one with the other.

Appellants submit that the Examiner made a generalized statement (quoted at the beginning of the previous paragraph) regarding Appellants' claim 12, despite the fact that Westmoreland is incapable of removing crystalline Ru oxides, which includes $SrRuO_3$. Since this appears to be the principle basis for applying the rejection of claim 12, Appellants traverse the Examiner's statements. Appellants submit that "[d]eficiencies of the cited references cannot be remedied by the Board's general conclusions about what is "basic knowledge" or "common sense."" In re Lee, 61 USPQ2d 1430, 1432-1433 (Fed. Cir. 2002), quoting In re Zurko, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001).

The Examiner has therefore not met at least one of the essential criteria for establishing a *prima facie* case of obviousness, wherein "the prior art reference (or references when combined) must teach or suggest all the claim limitations." See M.P.E.P. §§ 2142, 2143, and 2143.03. "In the absence of a proper *prima facie* case of obviousness, an applicant who complies with the other statutory requirements is entitled to a patent. … On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness…" In re

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Rouffet, 47 USPQ2d 1453, 1455 (Fed. Cir. 1998). Also, "[i]f an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious." See M.P.E.P. § 2143.03, p. 2100-26.

Furthermore, "Examiners are reminded that a dependent claim is directed to a combination including everything recited in the base claim and what is recited in the dependent claim. It is this combination that must be compared with the prior art, exactly as if it were present as one independent claim." M.P.E.P. § 608.01(n)(III), p. 600-77.

Thus, dependent claim 12 is allowable at least by virtue of its dependence from base claim 17. Therefore, Appellants respectfully request that the Board overturn the improper 35 U.S.C. § 103(a) rejection.

For all the reasons advanced above, the Board should reverse the rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a), and permit allowance of all the rejected claims.

IX. Appendix

Appendix A, attached, contains a clean copy of claims 11, 12 and 17 – 22 involved in this appeal.

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Please grant any extensions of time required to enter this Appeal Brief and charge any additional fees required to our Deposit Account No. 06-0916.

Respectfully submitted,

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Dated: August 5, 2002

By: Richard V. Burgujian Reg No 24,014
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"APPENDIX A" TO APPEAL BRIEF OF AUGUST 5, 2002

11. A polishing method according to claim 17, wherein said second polishing liquid does not contain abrasive grains.

12. A polishing method according to claim 17, wherein said Ru compound is $SrRuO_3$.

17. A polishing method comprising:

preparing a first polishing liquid containing tetravalent cerium ions in a first concentration;

adding a solvent to said first polishing liquid to form a second polishing liquid containing tetravalent cerium ions in a second concentration lower than the first concentration;

polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid,

wherein said addition of the solvent is carried out upon or immediately before the polishing of said substrate.

18. A polishing method according to claim 17, wherein said second polishing liquid contains cerium (IV) nitrate in a concentration of 0.75% or more by weight.

19. A polishing method according to claim 18, wherein said second polishing liquid contains cerium (IV) nitrate in a concentration of 0.75 to 2% by weight.

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20. A polishing method according to claim 17, wherein said second polishing liquid contains diammonium cerium (IV) nitrate in a concentration of 3% or more by weight.

21. A polishing method according to claim 20, wherein said second polishing liquid contains diammonium cerium (IV) nitrate in a concentration of 3 to 8% by weight.

22. A polishing method comprising:

preparing a first polishing liquid containing cerium (IV) nitrate in a first concentration;

adding a solvent to said first polishing liquid to form a second polishing liquid containing cerium (IV) nitrate in a second concentration lower than the first concentration;

polishing a surface of a substrate containing Ru or a Ru compound in a surface region with the second polishing liquid,

wherein said adding of the solvent is carried out upon or immediately before the polishing of said substrate.

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